

REMARKS

Description of Amendments

Without prejudice, applicants have amended the claims to facilitate prosecution. Specifically, the subject matter of claim 14 has been incorporated into claim 1. Instances in which "said receptacle" was recited in claim 1 have been amended to recite "at least one of said receptacles" to make the claim consistent with the added recitation that the housing comprises at least two receptacles (subject matter of claim 14). Claim 4 has been amended to make it independent and to incorporate the subject matter of previously amended claim 1 therein. New claims 31-33, 38-40, 43-45 have been added and depend from claims 15, 1, and 4, respectively. The subject matter of these claims was originally presented in claims 24-26, respectively. New claims 34-37 have been added and depend from amended claim 24. The subject matter of claims 34-37 was originally presented in claims 11-14, respectively. New claims 41 and 42 have been added and depend from claim 4. The subject matter of claims 41 and 42 was originally presented in claims 13 and 14. Claims 2, 3, 13, 14 and 16-23 have been cancelled. No new matter was added.

Allowable Subject Matter

The examiner found claims 4-10 to be allowable if rewritten to overcome the rejections under 35 U.S.C. §112 set forth in the last office action and to include all of the limitations of the base claim and any intervening claims. In response, Applicants have amended the application to include a copy of Title 47 (Telecommunications), Code of Federal Regulations, Chapter I (Federal Communications Commission), Subchapter B (Common

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Carrier Services), Part 68 (Connection of Terminal Equipment to the Telephone Network), Subpart F (Connectors), Section 68.500 (1992), which had been previously incorporated by reference. This regulation has been added to the application as Appendix A. The specification has been amended to make reference to this appendix. Additionally, claim 4 has been amended to include the subject matter previously presented in claim 1. Therefore, applicants submit that claims 4-10 are now in condition for allowance.

The examiner also found claims 14, 24-26 to be allowable if rewritten to include all of the limitations of the base claim and any intervening claims. In response, applicants have incorporated the subject matter of claim 14 into former claim 1 (from which claim 14 depended). Claim 1, as currently amended, should be in condition for allowance. Applicants have also incorporated the subject matter of previously amended claim 1 into claim 24. Claim 24, as currently amended, should also be in condition for allowance.

The examiner has already found claims 15, 27-30 to be allowable. Applicants gratefully acknowledge this finding.

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In light of the above remarks, an early allowance of the claims is earnestly solicited.
Thank you.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'SJD', is written over a horizontal line.

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SJD/dl

A:\Transmittal of response to final OA dated 6-10-03.wpd

Appendix A

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Subpart F—Connectors

SOURCE: 41 FR 28699, July 12, 1976, unless otherwise noted.

§ 68.500 Specifications.

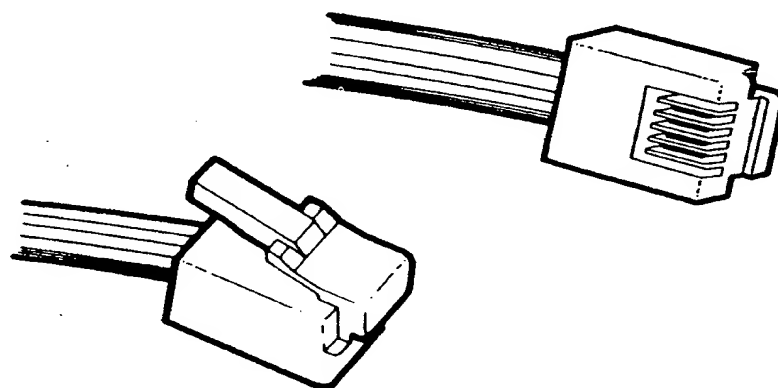
General. The US customary units are shown in parentheses throughout this subpart F. US customary units were the original dimensional units used in designing the plugs and jacks shown in the following pages. The dimensions shown without parenthesis are in SI units. The SI dimensional units are derived from the US customary units by multiplying "inches" by "25.4" to derive the exact conversion in millimeters with no rounding-off of the resulting decimal value. The number of decimal places to which the conversion is taken by adding a particular number of zeroes to the right end of the resulting SI value, where required, is governed by the concept that when the calculated SI dimensional unit is divided by "25.4," the resulting "inches" calculation will be exactly that shown in the parenthesis (the original design dimension). The conversion to SI force units, newtons, is rounded off to a number of decimal places that will result in the calculated SI force value being within less than one percent of the original US customary force unit value located adjacent in parenthesis (the original design value). The rationale for this is that this will bring the force conversions to within the degree of accuracy of the force-measuring de-

vice and avoid the carrying of an unrealistic number of decimal places which would otherwise result from an exact conversion. The plugs and jacks described in this section represent the standard connections to be used for connections to the telephone network. The plug and jack designs shown are representative of generic types, and should not be interpreted as the only designs that may be used. Design innovation and improvement is expected; but for interchangeability to be maintained, alternative designs (the "or equivalent" permitted in § 68.104) must be compatible with the plugs and jacks shown. The interface dimensions between mating plugs and jacks must be maintained. Hardware used to mount, protect, and enclose standard jacks is not described. The only requirement on connecting blocks, housings, dust covers, outdoor boxes, and the like that contain standard network jacks is that they accept standard plugs with cordage. For special purpose applications, plugs may be made longer than shown or adapted for direct use on equipment or apparatus without cordage. The sliding modular plug used on the back of many modular wall telephone sets is an example of such a special purpose application. It is the responsibility of the designers and manufacturers of communication equipment who use such plugs to assure that they are compatible with the hardware used to mount standard jacks with which they plan to interface. For the purposes of this section, hard gold and contact performance equivalent to gold shall be determined in accordance with the standards detailed in Appendix H of TIA Telecommunications Systems Bulletin No. 31 Part 68 Rationale and Measurement Guidelines (TSB.31), prepared by EIA/TIA TR-41 Committee on Telephone Terminals (1992). This publication may be obtained by contacting Global Engineering Documents, 7730 Carondelet Avenue, Suite #407, St. Louis, Missouri, 63105. (Telephone number 1-800-854-7179).

(a) *Miniature 6-position plug:*

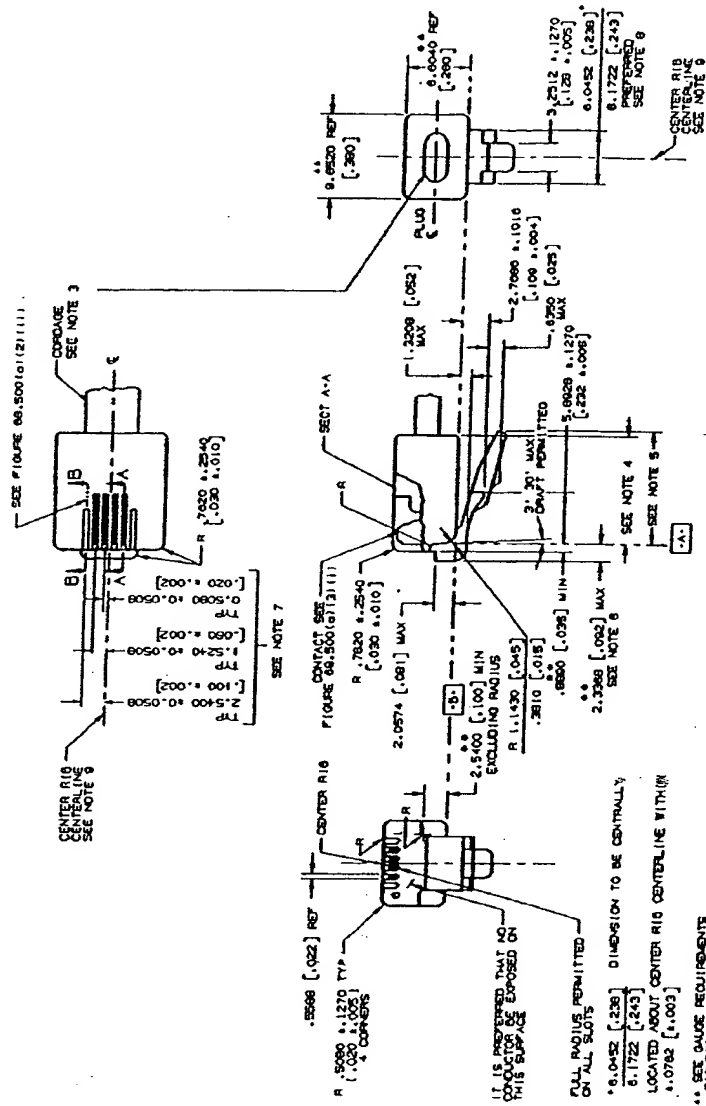
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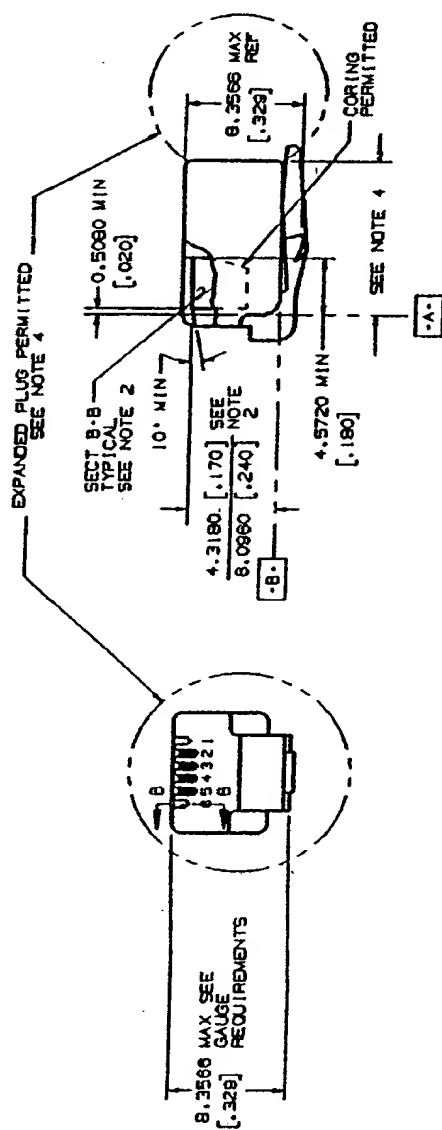
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(Note: This plug is depicted equipped with 4 contacts; it may be fabricated with its full 6 contact capability.)

Figure 68.500(a)(1)(i)–View

FIGURE 68.500(1)(2)(1) - 6 POSITION PLUG
MECHANICAL SPECIFICATION



NOTE! ALL NOTES FOLLOW THIS FIGURE.

FIGURE 68.500(a)(2)(ii) - 6 POSITION PLUG
MECHANICAL SPECIFICATION (CONTINUED)

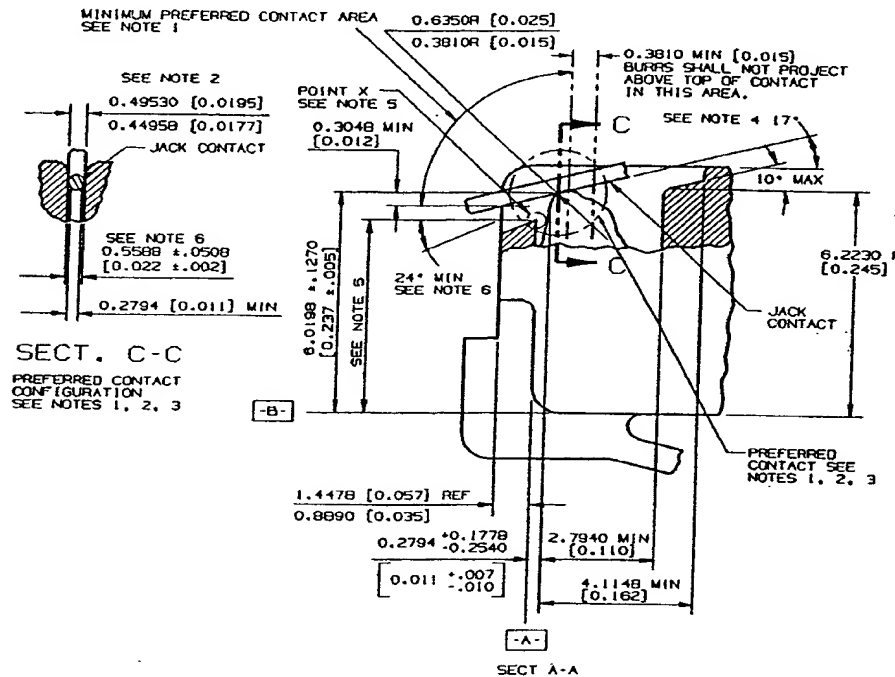
NOTES: (Notes apply to Figures 68.500(a)(2)(i) and 68.500(a)(2)(ii))

1. All plugs must be capable of meeting the requirements of the plugs go and no-go gauges.

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2. Section BB applies to any jack contact receiving slot which does not contain a plug contact.
3. The preferred major cordage cross section is 2.5400 mm (.100 inch) max. thick by 5.0800 mm (.200 inch) max. wide, with rounded corners. It should exit the plug on the plug centerline. Other cordage configurations are permitted but may inhibit the special features of some network jack enclosures.
4. The standard plug length is 11.6840 mm (.460 inch) max. Plugs may be made longer than standard or adapted for direct use on special cords, adapters with out cordage, and on apparatus or equipment subject to the limitations described in the Section 68.500 introductory paragraphs. Plugs longer than standard may inhibit the special features of some network jack enclosures.
5. A 12.0396 mm (.474 inch) minimum tab length is required. It is preferred that a maximum tab length be no longer than 13.2080 mm (.520 inch). Longer tabs may be used with the same limitations as described in Note 4.
6. To obtain maximum plug guidance when 6-position plugs are inserted in 8-position jacks, it is desirable to extend the front plug nose to the 2.3368 mm (.092 inch) maximum.
7. These dimensions apply to the location of jack contact receiving slots. It is desirable that plug contacts be centered axially in these slots, but centering is not required.
8. The 6.0452/6.1722 mm (.238/.243 inch) dimension is preferred to obtain maximum plug guidance in jacks with more than 6 conductors. A tolerance range of 5.9182/6.1722 mm (.233/.243 inch) is permitted, but may create targeting problems in 8-position jacks.
9. The center rib centerline shall be coincident with the plug width 9.6520 mm (.380 inch) ref. centerline within $\pm .0762$ mm ($\pm .003$ inch).



NOTE: ALL NOTES FOLLOW THIS FIGURE.

NOTE: THE B POSITION PLUG/JACK CONTACT SPECIFICATION IS IDENTICAL.

FIGURE 68.500(a)(1)(i)- 6 POSITION PLUG
PLUG /JACK CONTACT SPECIFICATION

NOTES: (Notes apply to Figure 68.500(a)(3)(i))

1. The plug/jack contact interface should be hard gold to hard gold and should have a minimum gold thickness of .0012700 mm (.000050 inch) on each side of the interface. The minimum contact force should be .98 N (100 grams). Any non-gold contact material must be compatible with gold and provide equivalent contact performance. A smooth, burr-free surface is required at the interface in the area shown.
2. The jack contact design is based upon .4572 mm (.018 inch) spring temper phosphor bronze round wire in the modular plug blade and jack contact interface. Other

- contact configurations that provide contact performance equal to or better than the preferred configurations and do not cause damage to the plug or jack are permitted. The preferred jack contact width is .44958/.49530 mm (.0177/.0195 inches). Deviations from the preferred jack contact width are permitted for round contacts as well as noncircular cross sectional shapes but they must be compatible with existing plug configurations. The requirements of Note 1 apply to all possible contact areas.
3. The configuration of the plug contact and the front plastic of the plug should prevent

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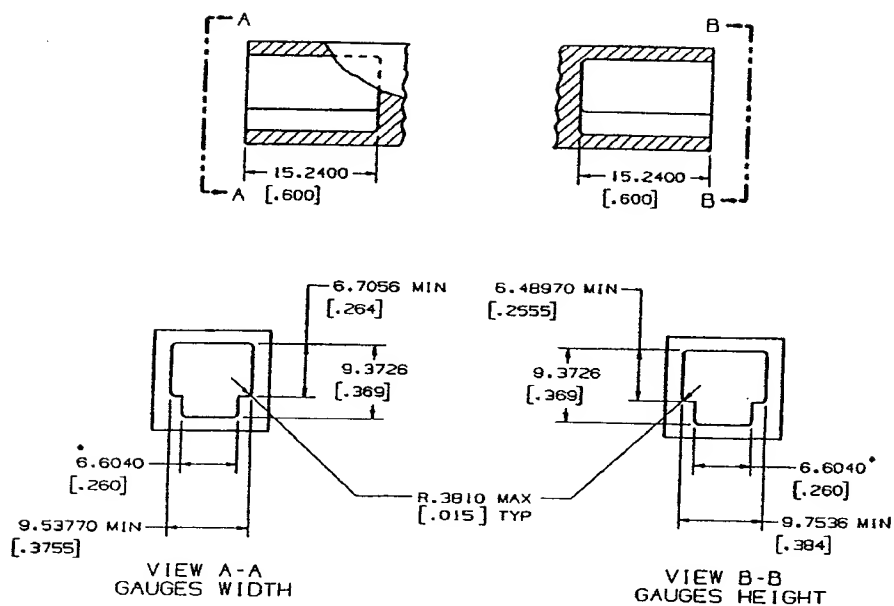
jack contacts from being damaged during plug insertion into jacks.

4. This is the suggested nominal contact angle between plugs and jacks with the plug latched into the jack. If this angle becomes greater than 24 degrees loss of electrical contact may occur between the plug and jack. If the nominal contact angle becomes less than 13 degrees, interference between jack contacts and the internal plastic in the plug may occur.

5. To avoid loss of electrical contact, the preferred dimension from datum B to the highest point "X" should be 5.0800 mm (.200 inch) max. A dimension greater than 5.3594 mm (.211 inch) may result in loss of electrical contact between plugs and jacks. The 5.3594 mm (.211 inch) max. shall be considered an absolute maximum.
6. The 24 degree min. angle applies only to plugs with front plastic walls higher than 4.8260 mm (.190 inches).

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NO-GO GAUGE

NOTES:

1. THE PLUG SHALL NOT BE CAPABLE OF ENTERING THE GAUGE MORE THAN 1.7780mm [0.070] BEYOND DATUM-A- (SEE FIGURE 68.500(a)(2)(iii)) WITH 8.90 newtons [2.0 POUNDS] INSERTION FORCE.
2. NON-TOLERANCED DIMENSIONS GIVEN TO FOUR PLACES SHALL BE WITHIN $\pm 0.0508\text{mm}$ [0.002].
3. $\pm 6.6040\text{mm}$ [0.260] DIMENSION TO BE CENTRALLY LOCATED WITH RESPECT TO 9.7536mm [0.384] MINIMUM AND 9.53770mm [0.3755] MINIMUM WITHIN $\pm 0.0508\text{mm}$ [0.002].

FIGURE 68.500(a)(4)(i) - 6 POSITION PLUG MINIMUM PLUG SIZE



NOTES

1. THE PLUG SHALL BE CAPABLE OF INSERTION AND LATCHING INTO THE GUAGE WITH 22.24 newtons [5 POUNDS] OR LESS INSERTIONS FORCE. PLUG LATCHING BAR SHALL BE DEPRESSED SO AS NOT TO INTERFERE WITH THE PLUG ENTRY. AFTER INSERTION AND LATCHING, PLUG SHALL BE CAPABLE OF REMOVAL, WITH THE LATCH DEPRESSED, WITH A REMOVAL FORCE OF 44.48 newtons [10 POUNDS] OR LESS APPLIED AT AN ADVANTAGEOUS ANGLE.
2. DIMENSIONS GIVEN TO FOUR DECIMAL PLACES SHALL BE WITHIN $\pm 0.0508\text{mm}$ [$\pm .002$].
3. DIMENSIONS (A) AND (B) TO BE CENTRALLY LOCATED WITH RESPECT TO 9.75360mm [.3840] MAX. JACK OPENING WIDTH WITHIN $\pm 0.0254\text{mm}$ [.001].
4. DO NOT SCALE DRAWINGS FOR EXTERNAL CONFIGURATION.

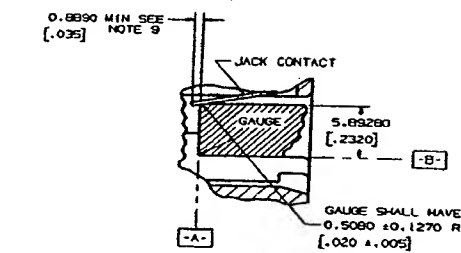
FIGURE 6B.500(6115)(1) - 6 POSITION PLUG
MAXIMUM PLUG SIZE

(b) *Miniature 6-position jack:*
(1) [Reserved]

[illegible]

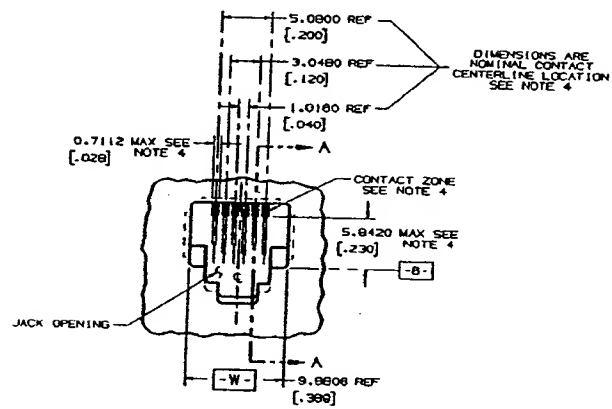
NOTE: ALL NOTES FOLLOW FIGURE 68.500(b)(3)(i) UNLESS SPECIFIED.

FIGURE 68.500(b)(2)(i) - 6 POSITION JACK
MECHANICAL SPECIFICATION



SEC A-A

(SHOWN WITHOUT REAR CONTACT GUIDES)



VIEW OF CONTACT ZONE

(SHOWN WITHOUT REAR CONTACT GUIDES)

NOTE: ALL NOTES FOLLOW THIS FIGURE.

FIGURE 68.500(b)(3)(i)- 6 POSITION JACK
MECHANICAL SPECIFICATIONS (CONTINUED)

NOTES: (Notes apply to Figures 68.500(b)(2)(i) and 68.500(b)(3)(i).)

1. Front surface projections beyond the 1.2700 mm (.050 inch) min. shall be configured so

as not to prevent finger access to the plug release catch (Reference Figure 68.500(a)(2)(i), 6-Position Plug, Mechanical Specifications). A catch length greater

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- than 1.2700 mm (.050 inch) is beneficial in providing greater breakout strength.
2. Surface Z need not be planar or coincident with the surface under the plug release catch. Surface Z projections must not prevent insertion, latching, and unlatching of the standard 6-position plug described in § 68.500(a).
3. The preferred plug stop surface is indicated. If some other internal feature is used as a plug stop, it must be located so that the axial movement of a latched plug is no greater than 1.1430 mm (0.045 inch).
4. To prevent mistargeting between the plug and jack contacts, the jack contacts should be completely contained in their individual contact zones, .7112 mm (.028 inch) max. wide, where they extend into the jack openings. There is no location requirement for jack contacts below these zones 5.8420 mm (.230 inch) max., but adequate contact separation must be maintained to prevent electrical breakdown. These shaded contact zones should be centrally located, (included all locating tolerances), about the jack opening width 9.8806 mm (.389 inch) Ref. (Datum -W-). Contacts located outside of these zones may result in mistargeting between the jack and plug contacts.
5. All inside and outside corners in the plug cavity to be .3810 mm (.015 inch) radius max. unless specified.
6. These surfaces shall have 0°15' maximum draft.
7. Relief inside the dotted areas on 3 sides of the jack opening is permitted. The 6.8326 mm (.269 inch) Ref and 9.8806 mm (.389 inch) Ref Gauge Requirements must be maintained in each corner, (ref. 1.0160 mm (0.040 inch) min), to assure proper plug/jack interface guidance. A .8128 mm ±.1270 mm

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- (.032 inch ±.005 inch) relief on the top side, (opposite plug catch), is required on jacks in connecting blocks which mount and connect portable wall telephones so as to assure interface with the special purpose sliding modular plug used on many wall telephone sets.
 8. 4.0640 mm (.160 inch) and 6.5278/6.8580 mm (.257/.270 inch) dimensions to be centrally located to jack opening width -W- within ±.1778 mm (0.007 inch).
 9. Minimum acceptable jack contact length. When contact guide slots are used, the contacts must always be contained inside the guide slots and the contacts must move freely in the slots so as not to restrain plug insertion or damage jack contacts.
 10. Gauge Requirements:
 - GO: The jack shall be capable of accepting a 9.7536 x 6.7056 mm (0.3840 x 0.2640 inch) gauge and the gauge shall be capable of being removed with a maximum force of 8.9 newtons (2 pounds).
 - NO GO: The jack shall not accept either a 10.00760 x 6.45160 mm (0.3940 x 0.254 inch) horizontal width of opening gauge or a 6.95960 x 9.5504 mm (.2740 x .376 inch) vertical height of opening gauge. However, if either gauge is accepted the force necessary to remove the gauge shall be minimum .83 newtons (3.0 ounces).
- Removal forces do not include forces contributed by contact springs nor shall external forces be applied to the jack that will affect these removal forces.
- Gauges shall have a .7620 mm (.030 inch) radius on the nose and a .3810 mm (0.015 inch) radius on all edges with clearance provided for contacts.
- (c) *Miniature 8-position plug, unkeyed:*

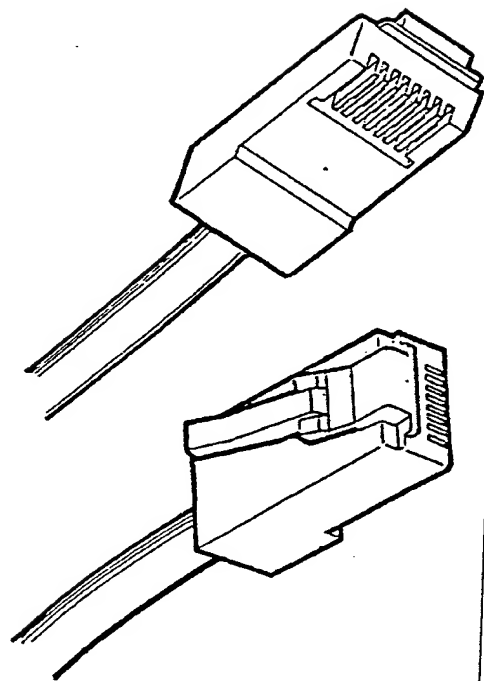
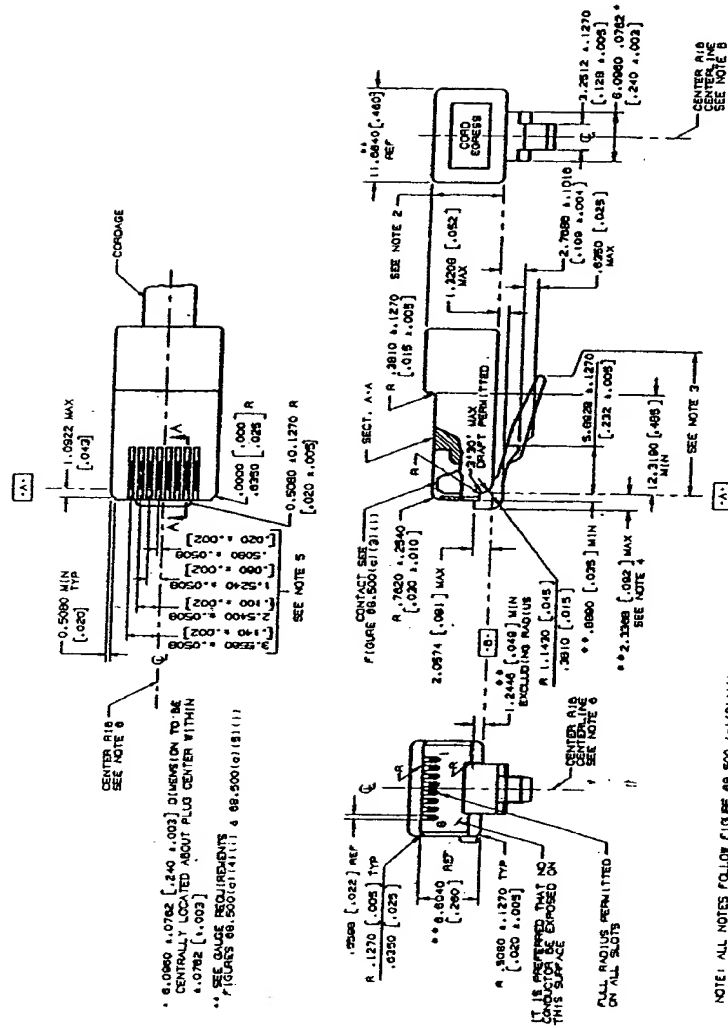
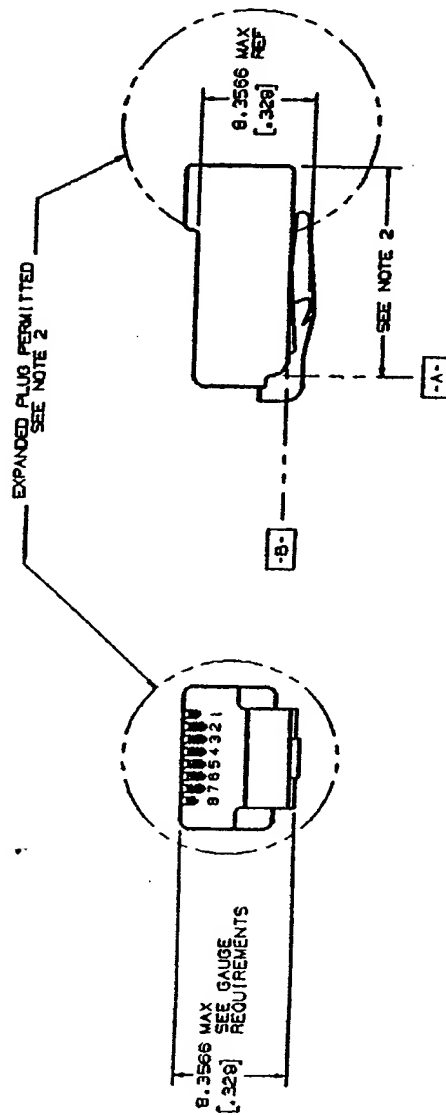


Figure 68.500(c)(1)(i) – View

NOTE: THIS PLUG IS DEPICTED WITH ITS FULL 8 CONTACT CAPACITY.
IT MAY BE FABRICATED WITH LESS THAN 8 CONTACTS.





NOTE: ALL NOTES FOLLOW THIS FIGURE.

FIGURE 68.500(c)(2)(ii) - 8 POSITION UNKEYED PLUG, MECHANICAL SPECIFICATION (CONTINUED)

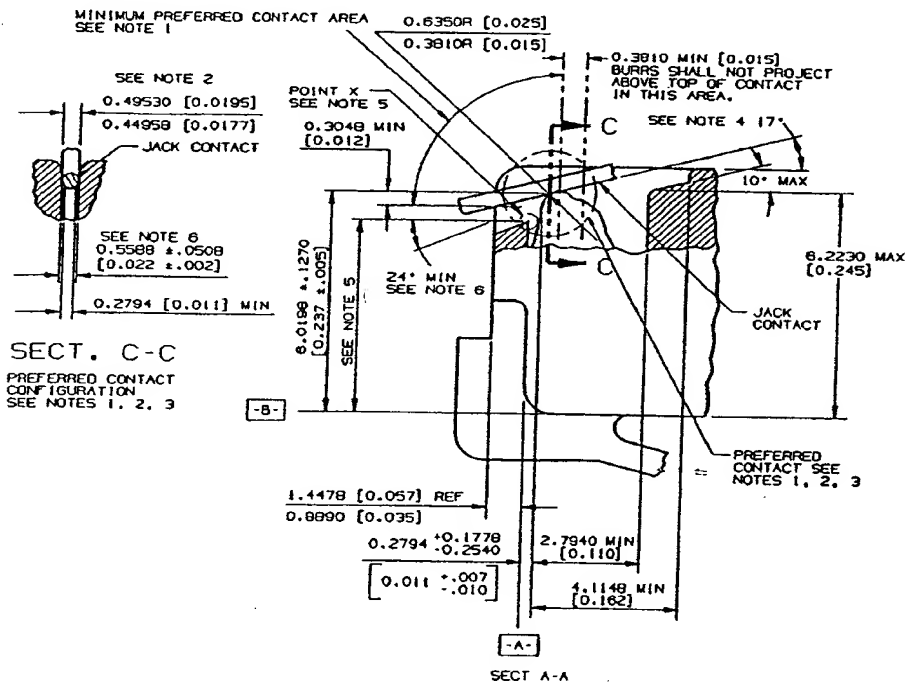
NOTES: (Notes apply to Figures 68.500(c)(2)(i) and 68.500(c)(2)(ii))

1. All plugs must be capable of meeting the requirements of the plug go and no-go gauges.

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2. The standard plug height in the area shown is 8.0010 mm (.315 inch) maximum. The standard plug length is 23.1140 mm (.910 inch) maximum. Plugs may be made longer than standard or adapted for direct use on special cords, adapters without cordage, apparatus or equipment subject to the limitations described in the introductory paragraphs of 68.500. Plugs longer and/or higher than standard may inhibit the special features of some network jack enclosures.
3. A 14.6050 mm (.575 inch) minimum tab length is required. It is preferred that a maximum tab length be no longer than 15.8750 mm (.625 inch). Longer tabs may be used with the same limitations described in Note 2.
4. To obtain maximum plug guidance in jacks, it is desirable to extend the front plug nose to the 2.3368 mm (.092 inch) maximum.
5. These dimensions apply to the location of jack contact receiving slots. It is desirable that plug contacts be centered axially in these slots, but centering is not required.
6. The center rib centerline shall be coincident with the plug width 11.6840 mm ref. (.460 inch ref.) centerline within ± 0.0762 mm (.003 inch).



NOTE: ALL NOTES FOLLOW THIS FIGURE.

NOTE: THE 6 POSITION PLUG/JACK CONTACT SPECIFICATION IS IDENTICAL.

FIGURE 68.500(c)(1)(3)(iii) - B POSITION UNKEYED PLUG
PLUG /JACK CONTACT SPECIFICATION

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NOTES: (Notes apply to Figure 68.500(c)(3)(i))

1. The plug/jack contact interface should be hard gold to hard gold and should have a minimum gold thickness of .0012700 mm (.000050 inch) on each side of the interface. The minimum contact force should be .98 N (100 grams). Any non-gold contact material must be compatible with gold and provide equivalent contact performance. A smooth, burr-free surface is required at the interface in the area shown.
2. The jack contact design is based upon .4572 mm (.018 inch) spring temper phosphor bronze round wire in the modular plug blade and jack contact interface. Other contact configurations that provide contact performance equal to or better than the preferred configurations and do not cause damage to the plug or jack are permitted. The preferred jack contact width is .44958/.49530 mm (.0177/.0195 inches). Deviations from the preferred jack contact width are permitted for round contacts as well as noncircular cross sectional shapes but they must be compatible with existing plug configurations. The requirements of Note 1 apply to all possible contact areas.
3. The configuration of the plug contact and the front plastic of the plug should prevent jack contacts from being damaged during plug insertion into jacks.
4. This is the suggested nominal contact angle between plugs and jacks with the plug latched into the jack. If this angle becomes greater than 24 degrees loss of electrical contact may occur between the plug and jack. If the nominal contact angle becomes less than 13 degrees, interference between jack contacts and the internal plastic in the plug may occur.
5. To avoid loss of electrical contact, the preferred dimension from datum B to the highest point "X" should be 5.0800 mm (.200 inch) max. A dimension greater than 5.3594 mm (.211 inch) may result in loss of electrical contact between plugs and jacks. The 5.3594 mm (.211 inch) max. shall be considered an absolute maximum.
6. The 24 degree min. angle applies only to plugs with front plastic walls higher than 4.8260 mm (.190 inches).

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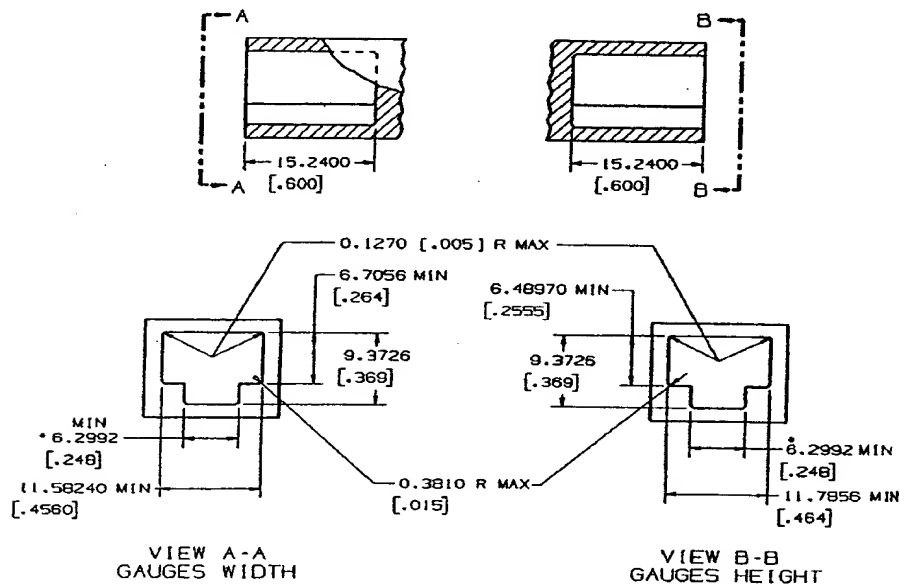
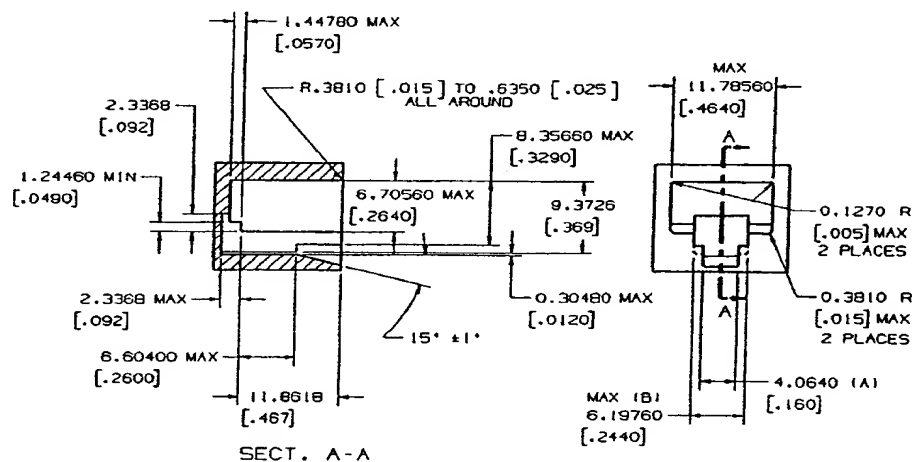


FIGURE 68.500(c)(4)(i)-B POSITION UNKEYED PLUG, MINIMUM PLUG SIZE



GO GAUGE

NOTES:

1. THE PLUG SHALL BE CAPABLE OF INSERTION AND LATCHING INTO THE GAUGE WITH 22.24 newtons [5 POUNDS] OR LESS INSERTION FORCE. PLUG LATCHING BAR SHALL BE DEPRESSED SO AS NOT TO INTERFERE WITH THE PLUG ENTRY. AFTER INSERTION AND LATCHING, PLUG SHALL BE CAPABLE OF REMOVAL, WITH THE LATCH DEPRESSED, WITH REMOVAL FORCE OF 44.48 newtons [10 POUNDS] OR LESS APPLIED AT AN ADVANTAGEOUS ANGLE.
2. DIMENSIONS GIVEN TO FOUR DECIMAL PLACES SHALL BE WITHIN $\pm 0.0508\text{mm}$ [.002].
3. DIMENSIONS (A) AND (B) TO BE CENTRALLY LOCATED WITH RESPECT TO 11.78560mm [.4640] MAX. JACK OPENING WIDTH WITHIN $\pm 0.0254\text{mm}$ [.001].
4. DO NOT SCALE DRAWINGS FOR EXTERNAL CONFIGURATION.

FIGURE 68.500(c)(1)(5)(i)-B POSITION UNKEYED
PLUG, MAXIMUM PLUG SIZE

(d) *Miniature 8-position series jack:*

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(d) *Miniature 8-position series jack:*

APPENDIX A-17

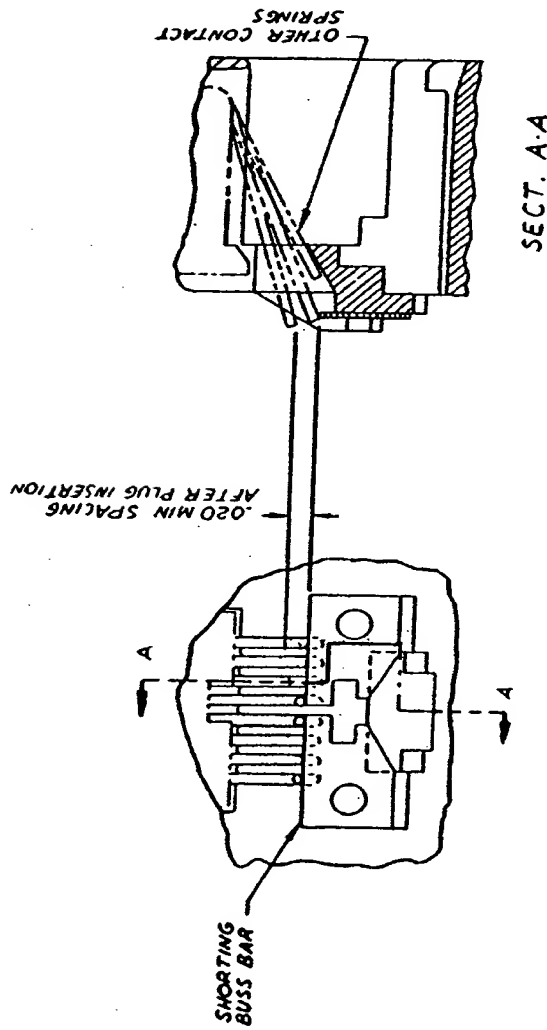
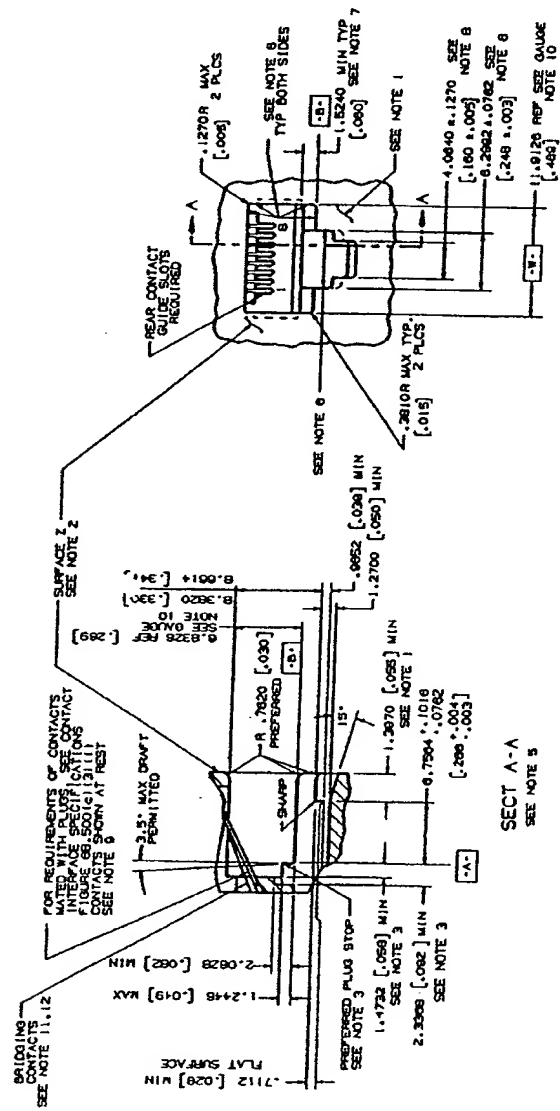


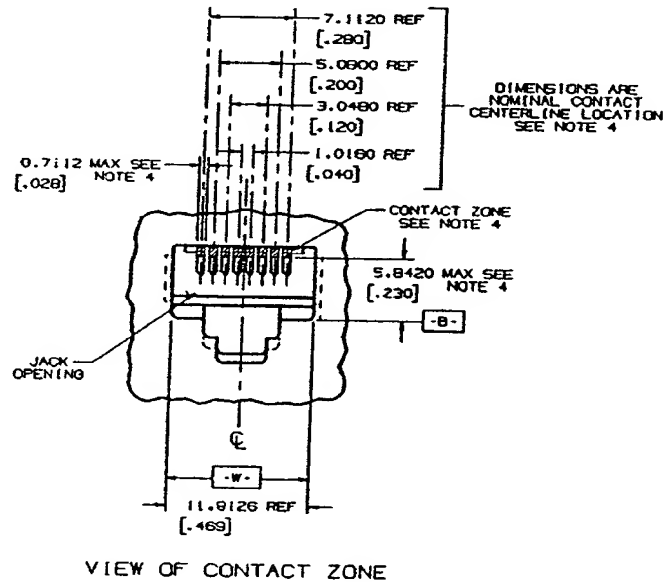
Figure 68.500(d)(3)--8 Position Series
Jack, Contact Specification

NOTE: THIS JACK IS DEPICTED WITH 8 CONTACTS.
FABRICATED WITH LESS THAN 8 CONTACTS.



NOTE: ALL NOTES FOLLOW FIGURE 88.500(d)(3)(1).

FIGURE 68.500(d)(2)(i)-B POSITION SERIES
JACK, MECHANICAL SPECIFICATION



NOTE: ALL NOTES FOLLOW THIS FIGURE.

FIGURE 68.500(d)(3)(i)-8 POSITION SERIES JACK, MECHANICAL SPECIFICATION (CONTINUED)

NOTES: (Notes apply to Figures 68.500(d)(2)(i) and 68.500(d)(3)(i))

1. Front surface projections beyond the 1.3970 mm (.055 inch) minimum shall be configured so as not to prevent finger access to the plug release catch (Reference Figure 68.500(a)(2)(i) and Figure 68.500(c)(2)(i) 6 and 8-Position Plug, Mechanical Specifications). A catch length greater than 1.3970 mm (.055 inch) is beneficial in providing for greater breakout strength and improved

guidance when interfacing with a 6-position plug.

2. Surface Z need not be planar or coincident with the surface under the plug release catch. Surface Z projections must not prevent insertion, latching, and unlatching of the standard 8-position plug on Figure 68.500(c)(2)(i).
3. The preferred plug stop surface is indicated. If some other internal feature is used as a plug stop, it must be located so

- that the axial movement of a latched plug is no greater than 1.1430 mm (.045 inch).
4. To prevent mistargeting between the plug and jack contacts, the jack contacts should be completely contained in their individual contact zones, (.7112 mm (.028 inch) max. wide), where they extend into the jack openings. There is no location requirement for jack contacts below these zones (5.8420 mm (.230 inch) max.), but adequate contact separation must be maintained to prevent electrical breakdown. These shaded contact zones should be centrally located, (include all locating tolerances), about the jack opening width 11.9126 mm (.469 inch) Ref, (Datum -W-). Contacts located outside of these zones may result in mistargeting between the jack and plug contacts.
 5. All inside and outside corners in the plug cavity to be .3810 mm (.015 inch) radius max. unless specified.
 6. These surfaces shall have 0°15' maximum draft.
 7. Relief inside the dotted areas on both sides of the jack opening is permitted. The 6.8326 mm (.269 inch) Ref and 11.9126 mm (.469 inch) Ref Gauge Requirements must be maintained in each of the corners indicated, (Ref. 1.5240 mm (.060 inch) min), to assure proper plug/jack interface guidance.
 8. 4.0640 mm (.160 inch) and 6.2992 mm (0.248 inch) dimensions to be centrally located to jack opening width -W- within $\pm .1270$ mm (.005 inch).
 9. The contact lengths shall be such that the contacts will always be contained inside the guide slots, and the contacts must move freely in the slots so as not to restrain plug insertion or damage jack contacts.
10. Gauge Requirements:
- GO: The jack shall be capable of accepting an 11.7856 x 6.7056 mm (.4640 x .2640 inch) gauge and the gauge shall be capable of being removed with a maximum force of 8.9 newtons (2.0 pounds).
- NO GO: The jack shall not accept either a 12.0396 x 6.4516 mm (.4740 x .254 inch) horizontal width of opening gauge or a 6.9596 x 11.5824 mm (.2740 x .456 inch) vertical height of opening gauge. However, if the gauge is accepted, the force necessary to remove the gauge shall be a minimum of .83 newtons (3.0 ounces).
- Removal forces do not include forces contributed by contact springs nor shall external forces be applied to the jack that will affect these removal forces.
- Gauges shall have a .7620 mm (.030 inch) radius on the nose and a .3810 mm (.015 inch) radius on all edges with clearance provided for contacts.
11. With no plug inserted, conductors 1 and 4 are bridged as well as conductors 5 and 8. With a miniature 8-position plug inserted into the jack, the bridge connectors are broken and a series connection can be made in both sides of the line. With a 6-position plug inserted, the bridged connections remain unbroken.
 12. The jack contact/bridging interface should be hard gold to hard gold and should have a minimum gold thickness of .0012700 mm (.000050 inch) on each side of the interface. The minimum contact bridging force should be .294 N (30 grams). Any non-gold contact material must be compatible with gold and provide equivalent contact performance.
- (e) *50-position miniature ribbon plug:*
- (1) Contact finish in the region of contact shall be gold, .0007620 mm (.000030 inch) minimum thickness, electrodeposited hard gold preferred.¹
 - (2) "Datum B" is the center line of contact cavities.
 - (3) The center line of each contact shall be located within .2286 mm (.009 inch) of true position with respect to "Datum B".¹
 - (4) Contact width at region of contact shall be 1.1430 \pm .0508 mm (.045 \pm .002 inch).¹
 - (5) Center line of shell dimension indicated shall be within .1270 mm (.005 inch) of "Datum B".¹
 - (6) Center line of barrier dimension indicated shall be within .1270 mm (.005 inch) of "Datum B".¹
 - (7) "Surface X" shall have a .0001016 mm (4 microinch) finish or better; finishing shall be done in the direction of the arrow.²
 - (8) A force of not more than 178 newtons (40 pounds) shall be sufficient to fully insert the plug onto the sizing gauge shown on Figure 68.500(e)(1). The plug is fully inserted when "Surface A" of the plug¹ touches "Surface A" of the sizing gauge.
 - (9) After one insertion of the plug on the sizing gauge, Figure 68.500(e)(2), a force of not more than 44.5 newtons (10 pounds) shall be sufficient to fully insert the plug on the continuity gauge shown in Figure 68.500(e)(3). The plug is fully inserted on the continuity gauge when "Surface A" of the plug¹ touches "Surface A" of the continuity gauge.
 - (10) When the plug is fully inserted on the continuity gauge, Figure 68.500(e)(3), after having been inserted once on the sizing gauge, Figure 68.500(e)(2), all contacts of the plug shall electrically contact the continuity gauge as determined by an electrical continuity test which applies an open circuit voltage of not more than 10 volts, and will not indicate continuity if the resistance of the circuit being checked is more than 200 ohms.

¹Figure 68.500(e)(1).²Figures 68.500 (e)(2) and (e)(3).

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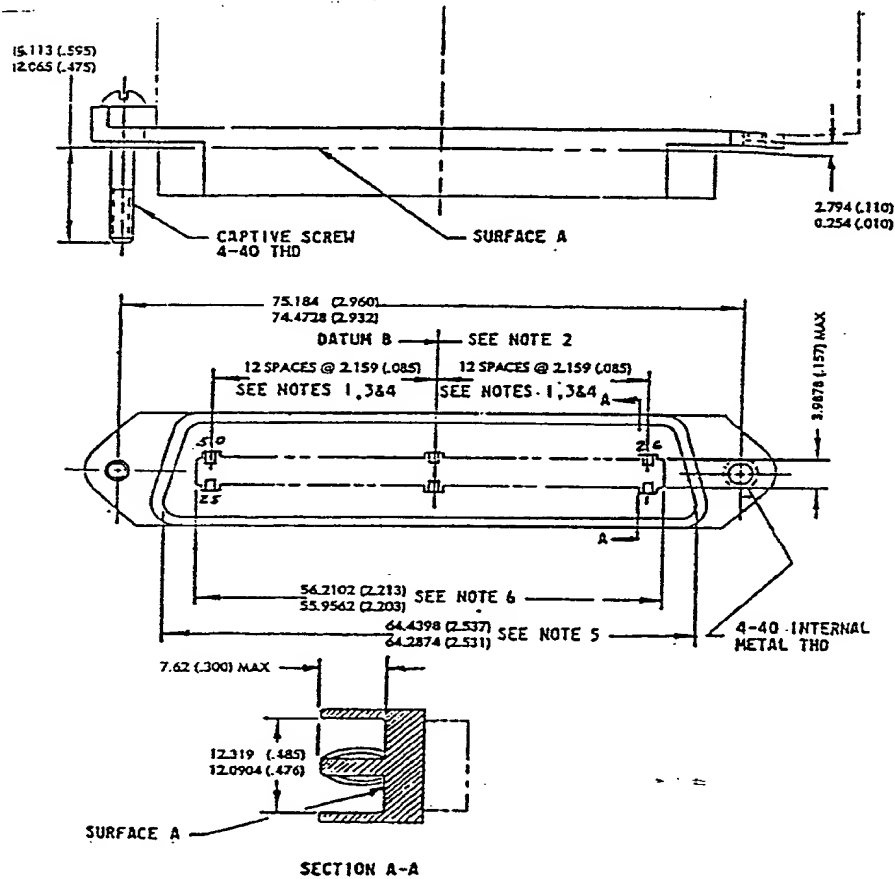


Figure 68.500(a)(1)--50 Position
Miniature Ribbon Plug

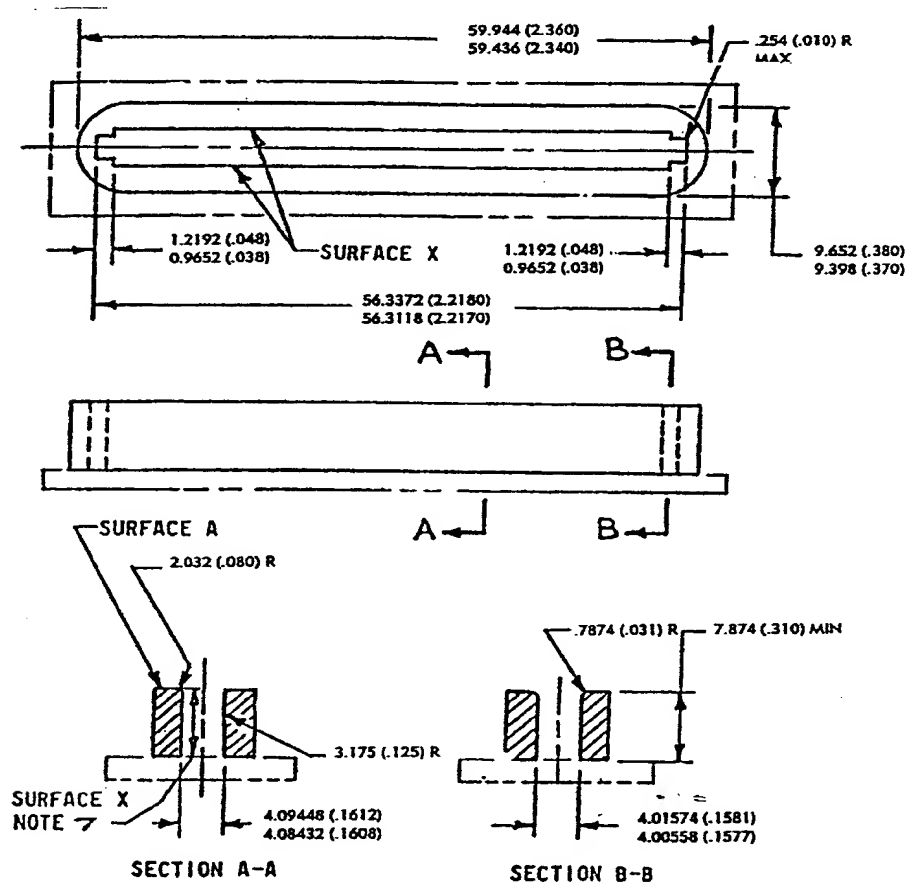


Figure 68.500(e)(2)--50 Position
Miniature Ribbon Plug
Sizing Gauge

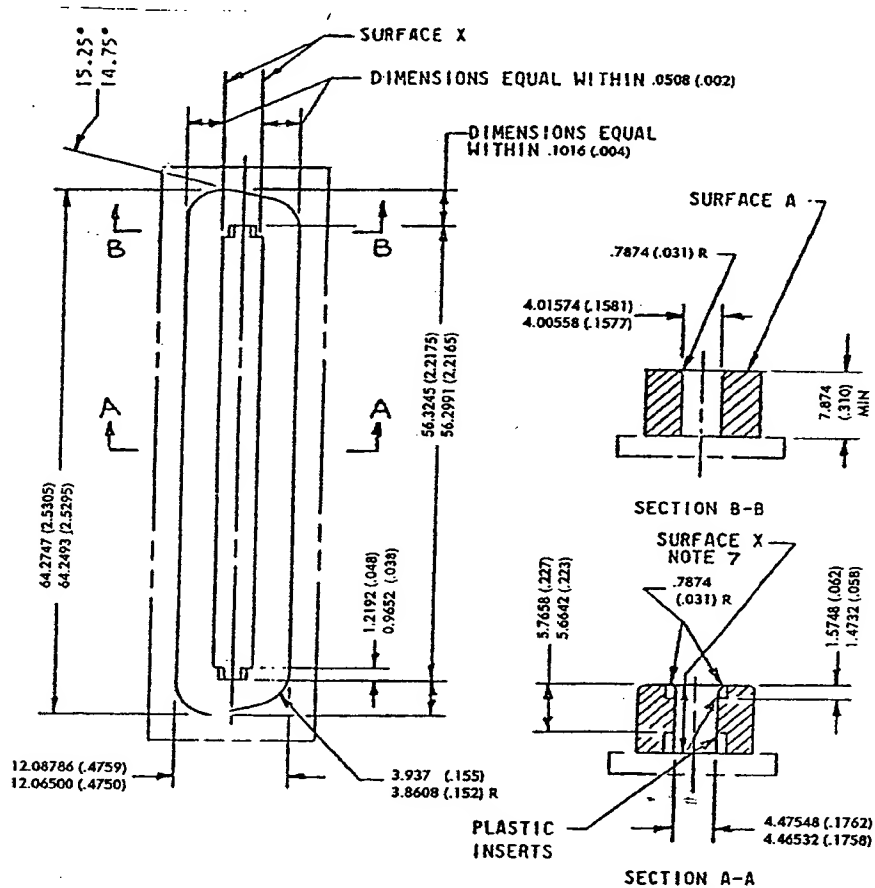


Figure 68.500(e)(3)--50 Position
Miniature Ribbon Plug
Continuity Gauge

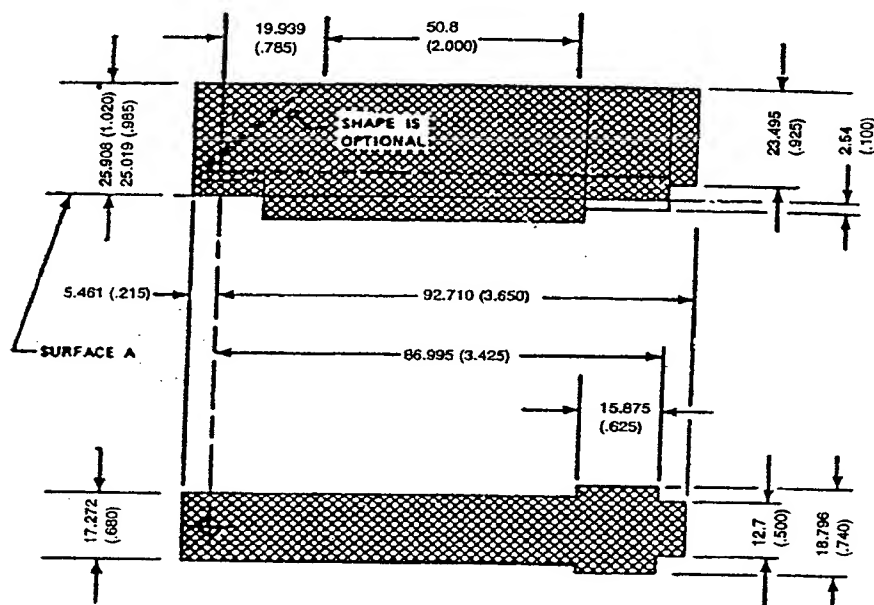


Figure 68.500(e) (4)

50-POSITION MINIATURE RIBBON PLUG - HOOD ENVELOPE**(f) 50-position miniature ribbon jack:**

(1) Contact finish in the region of contact shall be gold, .0007620 mm (.000030 inch) minimum thickness, electrodeposited hard gold preferred.¹

(2) "Datum B" is the center line of contact cavities.

(3) The center line of each contact shall be located within .2286 mm (.009 inch) of true position with respect to "Datum B".¹

(4) Contact width at region of contact shall be 1.1430 ± 0.0508 mm (.045 \pm 0.002 inch).¹

(5) Center line of shell dimension indicated shall be within .1270 mm (.005 inch) of "Datum B".¹

(6) Center line of cavity dimension indicated shall be within .1270 mm (.005 inch) of "Datum B".¹

(7) "Surface X" shall have a .0001016 mm (4 microinch) finish or better; finishing shall be done in the direction of the arrow.²

¹ Figure 68.500(f) (1).

² Figures 68.500 (f) (2) and (f) (3).

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(8) A force of not more than 134 newtons (30 pounds) shall be sufficient to fully insert the jack onto the sizing gauge shown on Figure 68.500(f)(2).

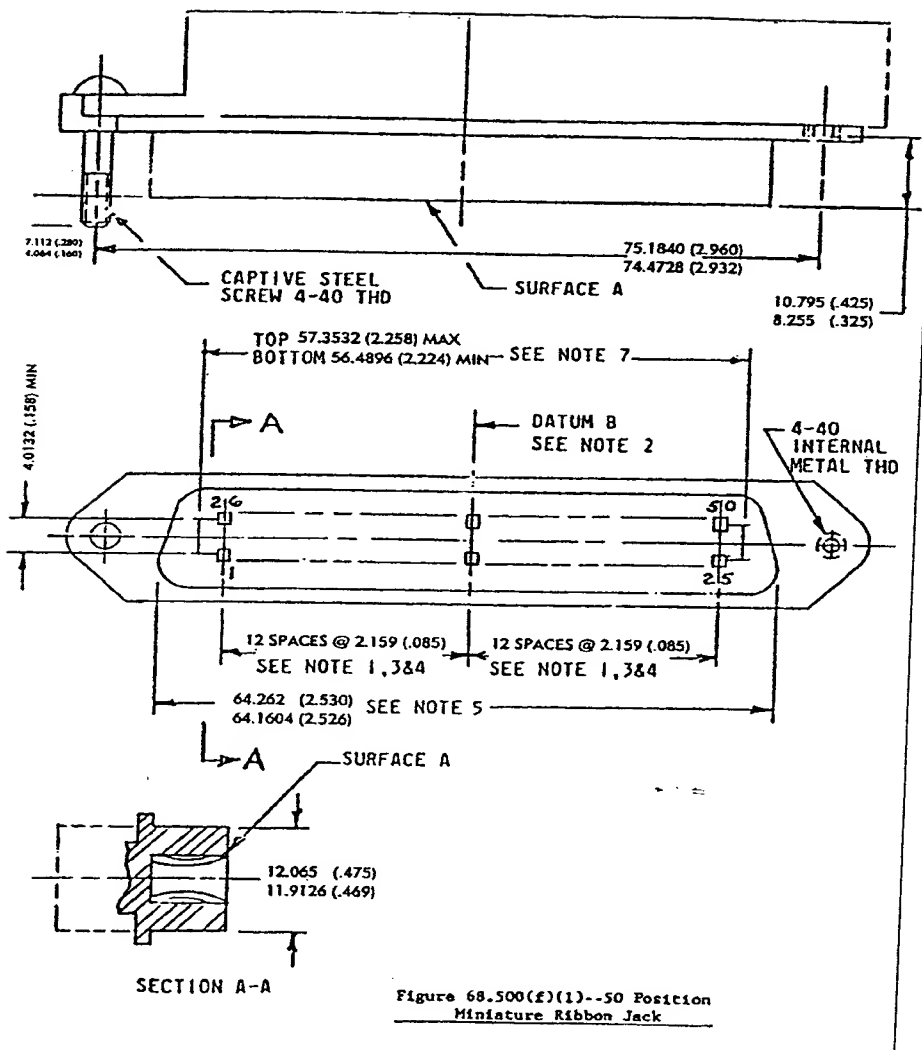
The jack is fully inserted when "Surface A" of the jack¹ touches "Surface A" of the sizing gauge.

(9) After one insertion of the jack on the sizing gauge, Figure 68.500(f)(2), a force of not more than 44.5 newtons (10 pounds) shall be sufficient to fully insert the jack on the continuity gauge shown in Figure 68.500(f)(3). The jack is fully inserted on the continuity

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gauge when "Surface A" of the jack¹ touches "Surface A" of the continuity gauge.

(10) When the jack is fully inserted on the continuity gauge, Figure 68.500(f)(3), after having been inserted once on the sizing gauge, all contacts of the jack shall electrically contact the continuity gauge as determined by an electrical continuity test which applies an open circuit voltage of not more than 10 volts, and will not indicate continuity if the resistance of the circuit being checked is more than 200 ohms.



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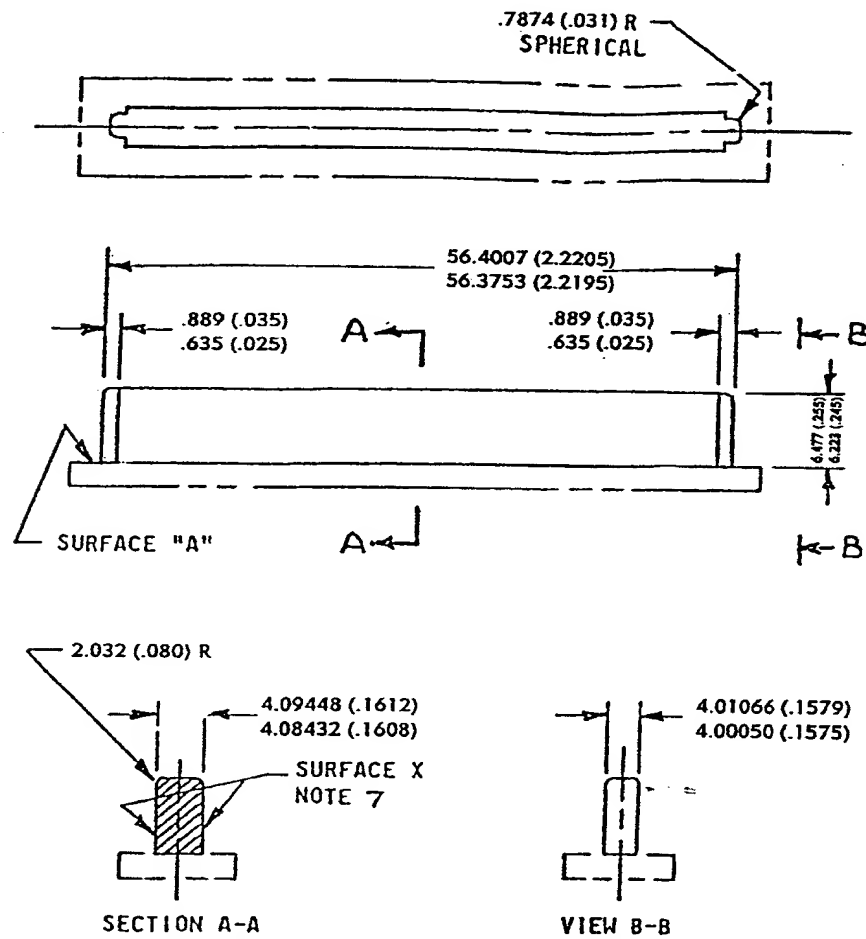


Figure 68.500(f)(2)--50 Position
Miniature Ribbon Jack
Sizing Gauge

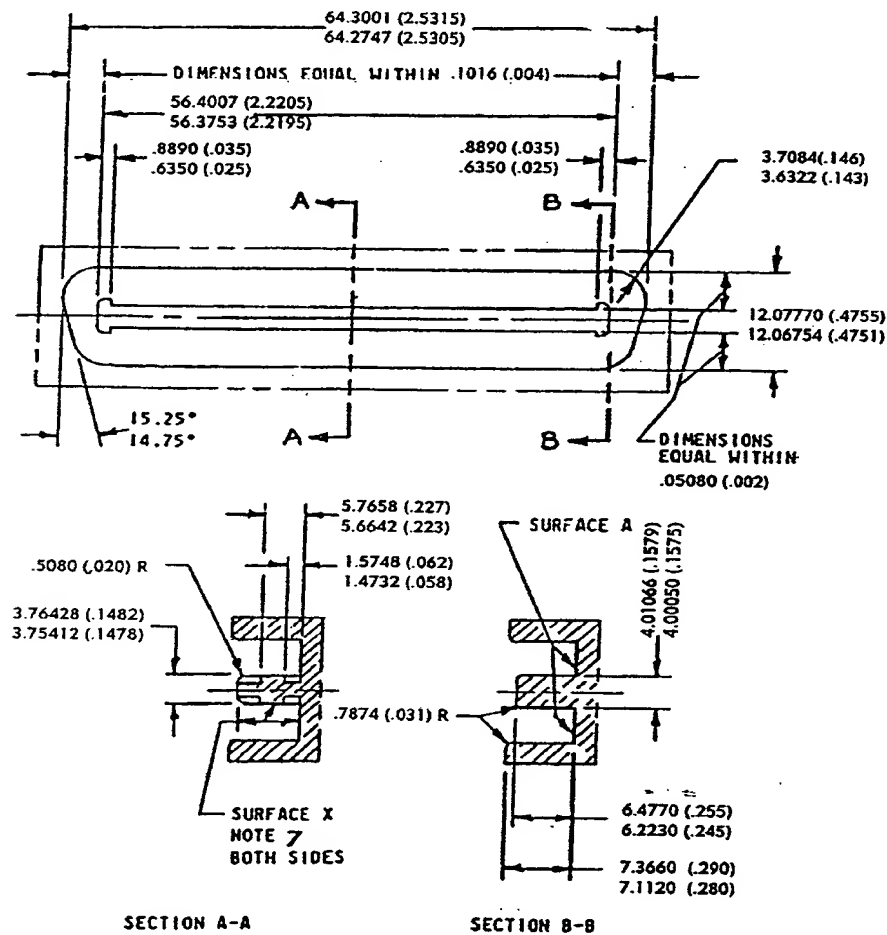


Figure 68.500(e)(3)--50 Position
Miniature Ribbon Jack
Continuity Gauge

(g) 3-Position weatherproof plug:
Contact blade material shall be brass, with minimum .00762 mm (.0003 inch) thick nickel plating.

NOTE: All linear dimensions are in millimeters (inches).

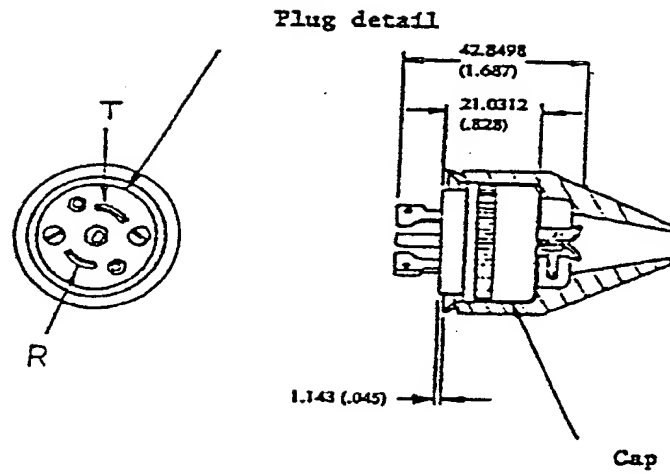
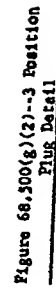


Figure 68.500(g)(1)--3 Position Plug
Plug Assembly



NOTE: All linear dimensions are in millimeters (inches).

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ENLARGED VIEW A
SCALE 2/1

ENLARGED VIEW B
SCALE 1/1

CENTERING OF NIBS
SCALE 2/1

Figure 68.500(h)--3 Position Plug Detail

(i) *Miniature 8-position plug, keyed:*

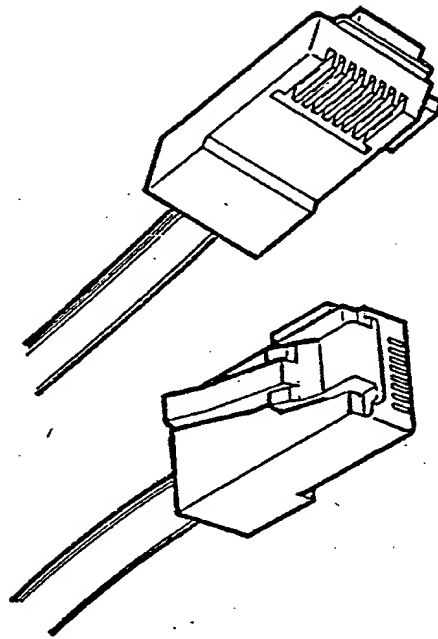
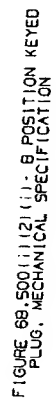


Figure 68.500(i)(1)(i)-View



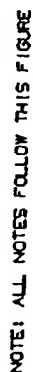


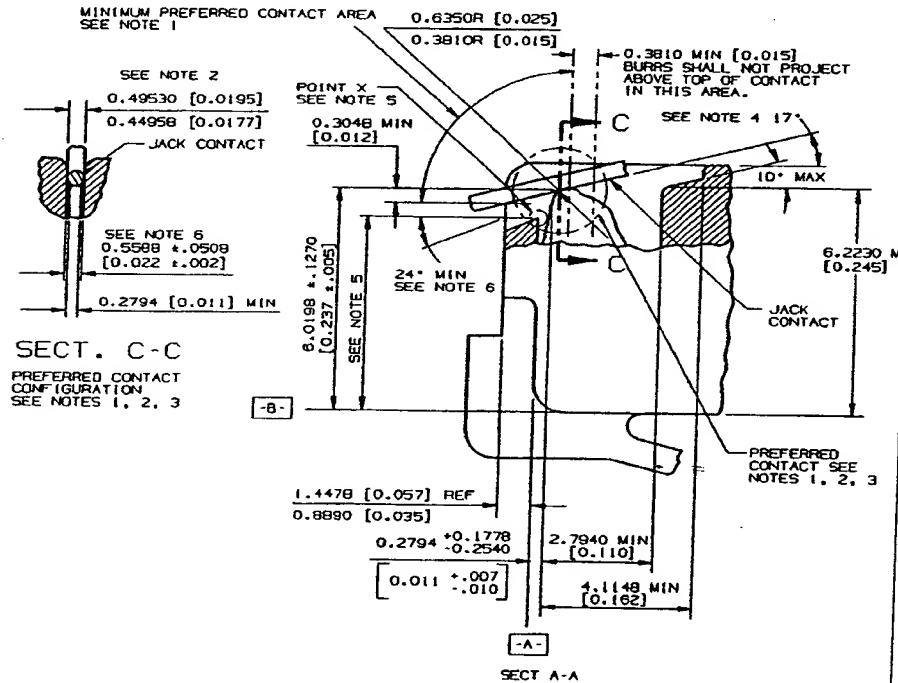
FIGURE 68.500(12)(1) - 8 POSITION KEYED
PLUG, MECHANICAL SPECIFICATION (CONTINUED)

1. All plugs must be capable of meeting the requirements of the plug go and no-go gauges.

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2. The standard plug height in the area shown is 8.0010 mm (.315 inch) maximum. The standard plug length is 23.1140 mm (.910 inch) maximum. Plugs may be made longer than standard or adapted for direct use on special cords, adapters without cordage, apparatus or equipment subject to the limitations described in the introductory paragraphs of 68.500. Plugs longer and/or higher than standard may inhibit the special features of some network jack enclosures.
3. A 14.6050 mm (.575 inch) minimum tab length is required. It is preferred that maximum tab length be no longer than 15.8750 mm (.625 inch). Longer tabs may be used with the same limitations described in Note 2.
4. To obtain maximum plug guidance in jacks, it is desirable to extend the front plug nose to the 2.3368 mm (.092 inch) maximum.
5. These dimensions apply to the location of jack contact receiving slots. It is desirable that plug contacts be centered axially in these slots, but centering is not required.
6. The center rib centerline shall be coincident with the plug width, 11.6840 mm ref (.460 inch ref.) center line within $\pm .0762$ mm ($\pm .003$ inch).



NOTE: ALL NOTES FOLLOW THIS FIGURE.

NOTE: THE 6 POSITION PLUG/JACK CONTACT SPECIFICATION IS IDENTICAL.

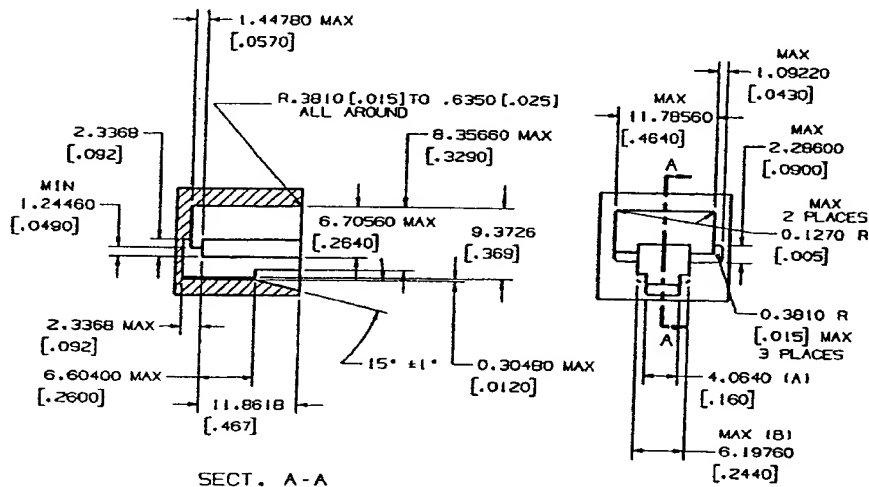
FIGURE 68.500(1)(3)(1) - B POSITION KEYED PLUG
PLUG /JACK CONTACT SPECIFICATION

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NOTES: (Notes apply to Figure 68.500(i)(3)(i))

1. The plug/jack contact interface should be hard gold to hard gold and should have a minimum gold thickness of .0012700mm (.000050 inch) on each side of the interface. The minimum contact force should be .98 N (100 grams). Any non-gold contact material must be compatible with gold and provide equivalent contact performance. A smooth, burr-free surface is required at the interface in the area shown.
2. The jack contact design is based upon .4572 mm (.018 inch) spring temper phosphor bronze round wire in the modular plug blade and jack contact interface. Other contact configurations that provide contact performance equal to or better than the preferred configurations and do not cause damage to the plug or jack are permitted. The preferred jack contact width is .44958/.49530 mm (.0177/.0195 inches). Deviations from the preferred jack contact width are permitted for round contacts as well as noncircular cross sectional shapes but they must be compatible with existing plug configurations. The requirements of Note 1 apply to all possible contact areas.
3. The configuration of the plug contact and the front plastic of the plug should prevent jack contacts from being damaged during plug insertion into jacks.
4. This is the suggested nominal contact angle between plugs and jacks with the plug latched into the jack. If this angle becomes greater than 24 degrees loss of electrical contact may occur between the plug and jack. If the nominal contact angle becomes less than 13 degrees, interference between jack contacts and the internal plastic in the plug may occur.
5. To avoid loss of electrical contact, the preferred dimension from "Datum B" to the highest point "X" should be 5.0800 mm (.200 inch) max. A dimension greater than 5.3594 mm (.211 inch) may result in loss of electrical contact between plugs and jacks. The 5.3594 mm (.211 inch) max. shall be considered an absolute maximum.
6. The 25 degree min. angle applies only to plugs with front plastic walls higher than 4.8260 mm (.190 inches).



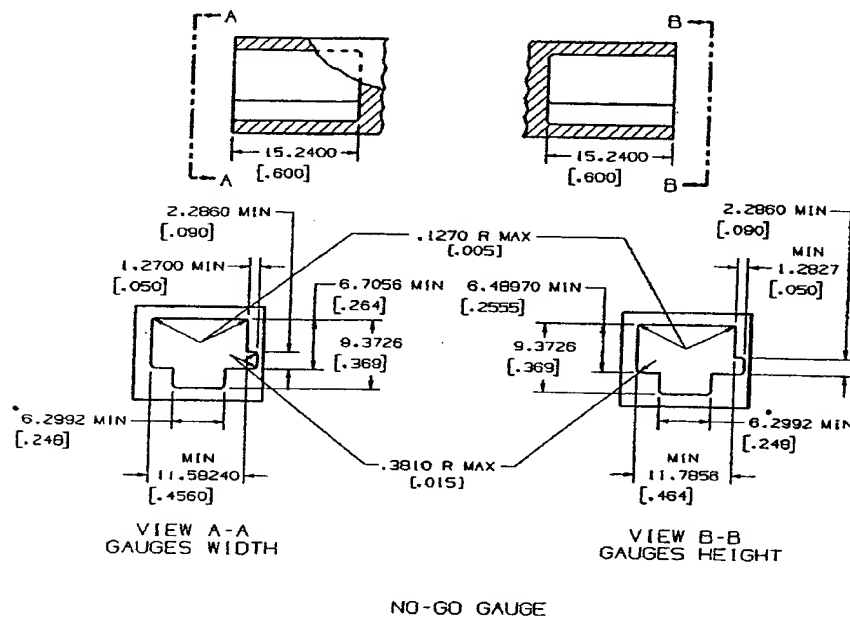
SECT. A-A

GO GAUGE

NOTES:

1. THE PLUG SHALL BE CAPABLE OF INSERTION AND LATCHING INTO THE GAUGE WITH 22.24 newtons [5 POUNDS] OR LESS INSERTION FORCE. PLUG LATCHING BAR SHALL BE DEPRESSED SO AS NOT TO INTERFERE WITH THE PLUG ENTRY. AFTER INSERTION AND LATCHING, PLUG SHALL BE CAPABLE OF REMOVAL, WITH THE LATCH DEPRESSED, WITH A REMOVAL FORCE OF 44.48 newtons [10 POUNDS] OR LESS APPLIED AT AN ADVANTAGEOUS ANGLE.
2. DIMENSIONS GIVEN TO FOUR DECIMAL PLACES SHALL BE WITHIN $\pm 0.0508\text{mm}$ [.002].
3. DIMENSIONS (A) AND (B) TO BE CENTRALLY LOCATED WITH RESPECT TO 11.78560mm [.4640] MAX. JACK OPENING WIDTH WITHIN $\pm 0.0254\text{mm}$ [.001].
4. DO NOT SCALE DRAWINGS FOR EXTERNAL CONFIGURATION.

FIGURE 68.500(1114)(111)-B POSITION KEYED PLUG
MAXIMUM PLUG SIZE



NOTES:

1. THE PLUG SHALL NOT BE CAPABLE OF ENTERING THE GAUGE MORE THAN 1.7780mm [0.070] BEYOND DATUM-A- (SEE FIGURE 68.500(1)(12)(1)) WITH 8.90 newton [2.0 POUNDS] INSERTION FORCE.
2. NON-TOLERANCED DIMENSIONS GIVEN TO FOUR PLACES SHALL BE WITHIN $\pm 0.0508\text{mm}$ [0.002].
3. *6.2992mm [0.248] DIMENSION TO BE CENTRALLY LOCATED WITH RESPECT TO 11.7856mm [0.464] MINIMUM AND 11.58240mm [0.4560] MINIMUM WITHIN $\pm 0.0508\text{mm}$ [0.002].

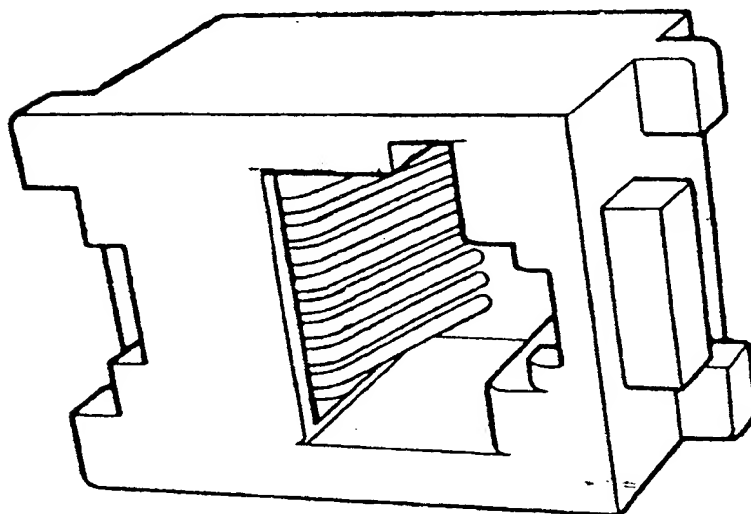
FIGURE 68.500(1)(12)(1)-B POSITION KEYED
PLUG, MINIMUM PLUG SIZE

(j) Miniature 8-position keyed jack:

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Figure 68.500(j)(1)--View



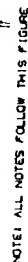


FIGURE 68.500(J)(2)(i)-8 POSITION KEYED JACK
MECHANICAL SPECIFICATION

68.500(i)(2)(ii) and 8-Position Plug, Mechanical Specifications). A catch length greater than 1.3970 mm (.055 inch) is beneficial in providing for greater breakout strength and improved guidance when interfacing with a 6-position plug.

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2. Surface Z need not be planar or coincident with the surface under the plug release catch. Surface Z projections must not prevent insertion, latching, and unlatching of the standard 8-position plug on Figure 68.500(i)(2)(i).
3. The preferred plug stop surface is indicated. If some other internal feature is used as a plug stop, it must be located so that the axial movement of a latched plug is no greater than 1.1430 mm (.045) inch.
4. To prevent mistargeting between the plug and jack contacts, the jack contacts should be completely contained in their individual contact zones, (7.112 mm (.028 inch) max wide), where they extend into the jack openings. There is no location requirement for jack contacts below these zones (5.8420 mm (.230 inch) max), but adequate contact separation must be maintained to prevent electrical breakdown. These shaded contact zones should be centrally located, (include all locating tolerances), about the jack opening width 11.9126 mm (.469 inch) Ref. (Datum-W-). Contacts located outside of these zones may result in mistargeting between the jack and plug contacts.
5. All inside and outside corners in the plug cavity to be .3810 mm (.015 inch) radius max unless specified.
6. These surfaces shall have 0°15' maximum draft.
7. Relief inside the dotted areas on both sides of the jack opening is permitted. The 6.8326 mm (.269 inch) Ref and 11.9126 mm (.469 inch) Ref Gauge Requirements must be maintained in each of the corners indicated, (Ref. 1.5240 mm (.060 inch) min), to assure proper plug/jack interface guidance.
8. 4.0640 mm (.160 inch) and 6.2992 mm (.248 inch) dimensions to be centrally located to jack opening width -W- within ±.1270 mm (.005).
9. The contact lengths shall be such that the contacts will always be contained inside the guide slots and the contacts must move freely in the slots so as not to restrain plug insertion or damage jack contacts.
10. Gauge Requirements:

GO: The jack shall be capable of accepting and 11.78560 × 6.70560 mm (.4640 × .2640 inch) gauge and the gauge shall be capable of being removed with a maximum force of 8.9 newtons (2.0 pounds).

NO GO: The jack shall not accept either a 12.03960 × 6.4516 mm (.4740 × .254 inch) horizontal width of opening gauge or a 6.95960 × 11.5824 mm (.2740 × .456 inch) vertical height of opening gauge. However, if the gauge is accepted, the force necessary to remove the gauge shall be minimum of .83 newtons (3.0 ounces).

Removal forces do not include forces contributed by contact springs nor shall ex-

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ternal forces be applied to the jack that will affect these removal forces.
Gauges shall have a .7620 mm (.030 inch) radius on the nose and a .3810 mm (.015 inch) radius on all edges with clearance provided for contracts.

[41 FR 28699, July 12, 1976, as amended at 45 FR 52151, Aug. 6, 1980; 50 FR 27251, July 2, 1985; 58 FR 44907, Aug. 25, 1993; 62 FR 36465, July 8, 1997]

§68.502 Configurations.

This section describes connection configurations which telephone subscribers may request their local telephone company to provide, in accordance with §68.104 of these rules. In the absence of a request for a specific jack configuration, the telephone company shall install the standard jack depicted in §68.502(a)(1). The listed configurations are for connections to be made by the telephone company to the standard jacks specified in this subpart. Plugs on registered terminal equipment and registered protective circuitry shall be wired so as to be compatible with the jack connections specified herein. The following nomenclature is used in this section:

T/R—Connections to the "tip" and "ring" wires of a telephone communications line, trunk, channel or facility.

A/A1—Connections to the "hold" functions of key telephone systems which use such connections. In such systems, the "A" lead corresponding to a particular telephone line is shorted to the "A1" lead when that line is placed in the "off-hook" state to permit proper operation of the "hold" functions associated with that line.

MB/MB1—Connections to leads implementing a make-busy feature where required. The MB lead is shorted by the terminal equipment to the MB1 lead when the corresponding telephone line is to be placed in an unavailable, or artificially busy condition.

Bridged—A bridged connection is a parallel connection.

Data—Data configurations are those which use jacks incorporating components to limit signal power levels of data equipment. Data equipment with a maximum signal power output of -9 dBm may be connected to other than data configurations. See §68.308 of these rules.

A "USOC" (Universal Service Ordering Code) is specified for each configuration. These USOCs are generic telephone company service ordering codes. If a telephone subscriber wishes to